CAR-4003 Series
Communication Appliance

User's Manual

Revision: 1.1

Table of Contents

Chapter 1   Introduction

1.1   About This Manual

This manual contains all required information for setting up and using the CAR-4003 series.

CAR-4003 provides the essential platform for delivering optimal performance and functionality in the value communications appliance market segment. This manual should familiarize you with CAR-4003 operations and functions. CAR-4003 series provide up to four on-board Ethernet ports to serve communication applications like Firewall, requiring four Ethernet ports to connect external network (internet), demilitarized zone and internal network.

CAR-4003 series overview:
◆   Two proprietary PCIe2.0 extension slots
◆   Compatible with Caswell's 10G and 1G expansion modules with copper and fiber interface
◆   Support all LGA-1156 processors
◆   Quad-Core > Dual Core > Single-Core
◆   Support One PCIex4 expansion slot in rear
◆   Support IPMI module
◆   Up to 20 GbE ports
◆   Dual channel DDR3 1333/1066/800 MHz ECC
◆   2.5GT/s DMI data rate
◆   Intel total solution

1.2   Manual Organization

This manual describes how to configure your CAR-4003 system to meet various operating requirements. It is divided into three chapters, with each chapter addressing the basic concept and operation of this system.

Chapter 1:   Introduction. This section describes how this document is organized. It includes brief guidelines and overview to help find necessary information.

Chapter 2:   Hardware Configuration Setting and Installation. This chapter demonstrated the hardware assembly procedure, including detailed information. It shows the definitions and locations of Jumpers and Connectors that can be used to configure the system.

Chapter 3:   Operation Information. This section provides illustrations and information on the system architecture and how to optimize its performance.

Any updates to this manual, would be posted on the web site: *http://www.cas-well.com*

1.3   Technical Support Information

Users may find helpful tips or related information on Caswell's web site: *http://www.cas-well.com* A direct contact to Caswell's technical person is also available. For further support, users may also contact Caswell's headquarter in Taipei or local distributors.
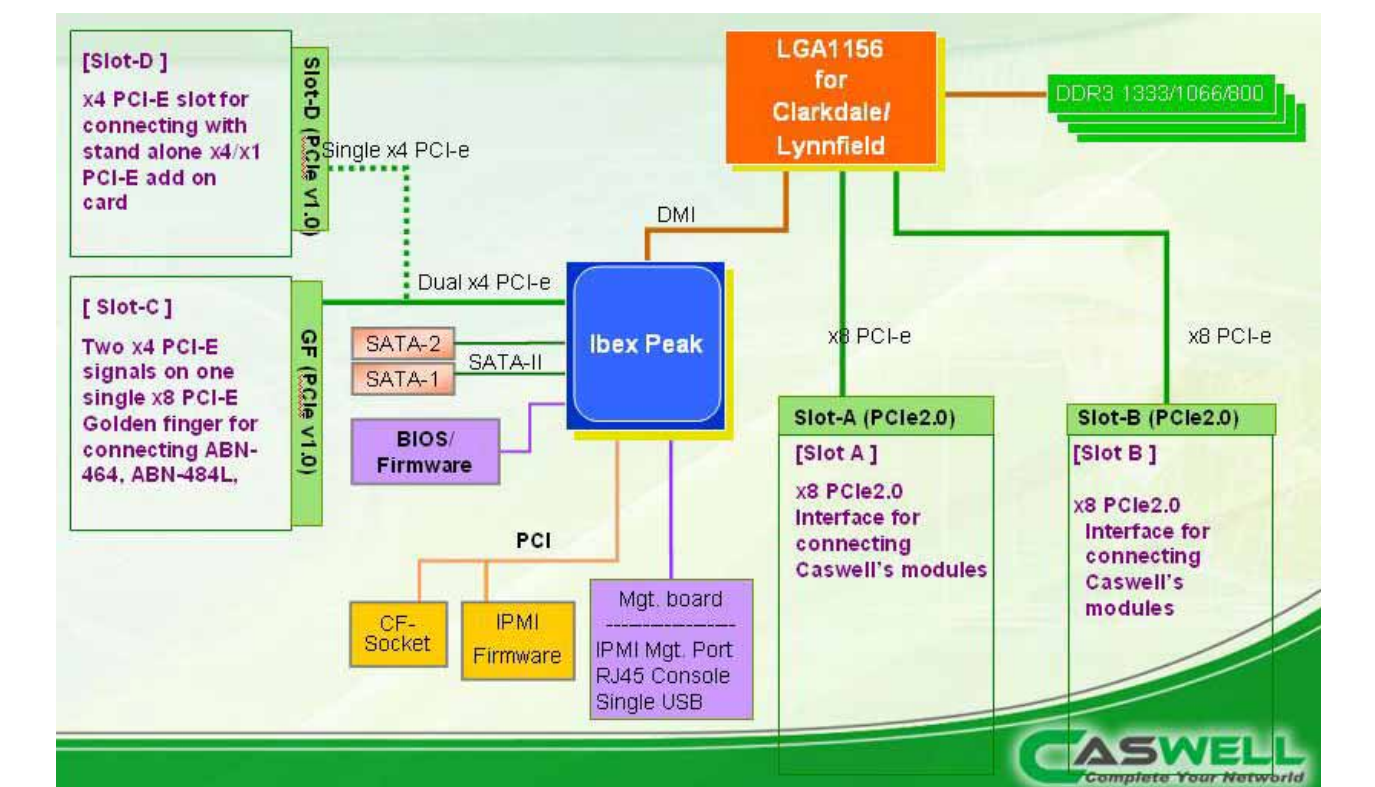
Taipei Office Phone Number: +886-2-77058888

Figure 1-1   Board Layout of CAR-4003 M/B

1.5   System Block Diagram

Figure 1-2   CAR-4003 Basic Block Diagram

1.6   Product Specifications

	Requirement	Detailed Description
1	System Description	CAR-4003 system series is 2 chip solution based on **Intel® Clarkdale and Lynnfield process and Intel® Ibex Peak chipset** with optional configuration to meet market requirements in-between top-P4 and high-end Xeon platform segments.
2	CPU	Supports LGA 1156 Server CPUs, including **Clarkdale and Lynnfield**, refer to Appendix-A for more detail.
3	CPU Board	◆ CAPB-4003VR with Intel® Lynnfield and Clarkdale process ◆ Board size: 194(W) x 235(D) mm
4	System Memory	◆ 4 DIMM slots ◆ Supports ECC UDIMMs: 2 channels x 2 DIMMs, up to 8GB ◆ Supports ECC RDIMMs: 2 channels x 2 DIMMs, up to 16GB (Lynnfield only)
5	Power Supply	◆ Full range ATX PSU with total 300~350W power output will be required (depends on power-budget). ◆ Power Budget: Refer to System Power Budget Table of sec. II-4. ERD should provide related data. ◆ AC On/Off switch is required. ◆ Certification: CE, UL, 3C ◆ Operating Mode: AT with power switch. ATX with power button. ◆ Dimension: 1U single PSU – 81.5(W) x 150(D) x 40.5 (H) mm
6	Chassis	◆ Form factor: 1U rack-mount chassis with a (rear) supporting bracket (trail) system (kit). ◆ To accommodate: M/B, EZIO-G300/EZIO-G400, PSU, one 3.5" HDDs, advanced Ethernet I/O module (ABN-458, ABN-494, ABN-522…), PCI-E card which is connected through backplane. ◆ Chassis depth: 1U w/ single PSU <18".
7	PCI-E Architecture	◆ Two PCI-E x8 from Intel® Clarkdale or Lynnfield to on-board slot for directly connecting with proprietary PCI-E add-on modules (ABN-series). ◆ Two pairs of PCI-Ex4 signal on a single PCI-E x8 golden finger from Intel® ibex peak to the left side for connecting with ABN module card (and PCI-E x4 add-on card) thought riser ◆ PCIe configuration table Table below.
8	Ethernet	◆ More details refer to Sec. II-1.
9	Expansion slots	◆ Form factor: 1U / 2U rack-mount chassis with a (rear) supporting bracket (trail) system (kit). ◆ To accommodate: M/B, EZIO-300/EZIO-G400, PSU, one 3.5" HDDs, advanced Ethernet I/O module (ABN-458, ABN-494, ABN-522…), PCI-E card which is connected through backplane.

PCIe configuration table (row 7):

Mode	Slot	Clarkdale/ Lynnfield
CAR-400x-xxx1-000 **CAR-400x-xxx3-000** **CAR-400x-xxx5-000**	Slot A	x4 or x8 PCIE *1
	Slot B	x4 or x8 PCIE *1
	Slot C	x4 PCIE *1or x4 PCIE *2
CAR-400x-xxx2-000 **CAR-400x-xxx4-000** **CAR-400x-xxx6-000**	Slot A	x4 PCIe *2
	Slot B	x4 PCIe *2
	Slot C	1PCIe x4 or 2PCIe x4

	Requirement	Detailed Description
10	SATA & IDE Interfaces	◆ One IDE channel shall be converted from PCI bus and supports one Compact Flash Socket. ◆ The IDE interface shall support DMA mode. ◆ Two SATA Interfaces on board with lockable connectors (B6210691)
11	Storage	◆ HDD 　- System is equipped default with fixed HDD 　- Space for one 3.5" SATA HDD or two 2.5" SATA HDD is required. ◆ On board CF socket for CF card.
12	VGA Interface	◆ Reserve a on-board VGA based on XMI Z9m or AST2050 (AST2050 for CAPB-4000VR-4003) ◆ A semi-cutting hole for standard D-Sub 15-pin VGA connector on chassis.
13	Power On/Off operation	◆ There should be an on/off switch on PSU itself or a separated on/off switch attached to PSU to turn the PSU on/off; this switch is for AT mode operation. ◆ There should be a toggle switch pin-header to allow ATX model operation. ◆ There is an "always on" item in the BIOS. System will be powered up automatically while power is resumed, if it is "on" before power failed. ◆ Customer can use OS command to shut down system power. ◆ More detailed Power on/off mode to be determined.
14	Front Panel	◆ EZIO-G300/ G400/ G500 ◆ 2 NAR-7090's module cards in normal. Maximum number is 3. ◆ One integrated connector with dual-USB connector and RJ45 connector for system console, tab-down, no LED. Pin-definition refers to Appendix B ◆ The Dual-USB connector should be optional. ◆ Hardware Reset Button ◆ Factory Default button (optional) ◆ Reserved Power button for project inquiry. ◆ LED: Signaling standard refer to Appendix D 　- System LED: Power, Data access. 　- Ethernet LED: For every Ethernet interface there should be LEDs for link status and speed of LAN-ports. 　- Bypass LED
15	Rear Panel	◆ Reserved semi-cutting opening of D-Sub 15 connector. ◆ AC power inlet ◆ Power on/off switch ◆ Opening for system ventilation (fan).
16	Chassis Color	Standard Pantone Black-UC
17	Dimension	443(W) x 446 (D) x 44 (H)

18 Environmental requirement		Operating	Storage	Transportation
	Acoustics	< 55dB	--	--
	Temperature	0°C to 45°C	-20°C to 75°C	--
	Relative Humidity	10 to 90% RH	5 to 95% RH	
	Shock	0.5 Sine shock, 10G peak, 10 +/- 3 ms on one axis		0.5 sine shock, 50G peak on each surface.
	Vibration	0.25G (Peak) / 5~500 Hz, 15 sec at each of 3 axis.	1.5G / 5~200 Hz at each of 3 axis.	

| 19 | Management | 1. Based on AST2050
2. w/ dedicated NIC |

Note 1: For Linux kernel 2.6 distribution add kernel option on boot loader " all-generic-ide"

For example: kernel /boot/vmlinuz-2.6.9-42.0.3.ELsmp ro root=LABEL=/ rhgb quiet all-generic-ide ==> **"all-generic-ide"**, this option will let kernel identify the device on IDE bus, and enable DMA

Note 2: For system stability, when execute software reset, system will delay 2~3 seconds; when execute hardware reset, system will cut off the power 1~2 seconds, the foregoing situation is normal.

1.7   CPU and Memory support

1. CPU support
This picture refers to the Intel authoritative information

CPU	Core Freq. (GHZ)	Turbo in GHz (4C/3C/2C/1C)	Cache (MB)	Cores/ Threads	DDR3 Memory Speed Support			PCIe Config[1]			RDIMM	ECC[2]	TDP	AES NI	VT-x	VT-d	TXT	Int. GFx[3]
					800	1066	1333	1x16	2x8	4x4								
Intel® Xeon® X3480	3.06	3.33/3.33/3.6/3.73	8	4/8	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	95		✓	✓	✓	
Intel® Xeon® X3470	2.93	3.2/3.2/3.46/3.6	8	4/8	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	95		✓	✓	✓	
Intel® Xeon® X3460	2.8	2.93/2.93/3.33/3.46	8	4/8	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	95		✓	✓	✓	
Intel® Xeon® X3450	2.67	2.8/2.8/3.2/3.2	8	4/8	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	95		✓	✓	✓	
Intel® Xeon® X3440	2.53	2.66/2.66/2.8/2.93	8	4/8	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	95		✓	✓	✓	
Intel® Xeon® X3430	2.4	2.53/2.53/2.66/2.8	8	4/4	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	95		✓	✓	✓	
Intel® Xeon® L3426	1.86	2.13/2.13/3.06/3.2	8	4/8	✓[4]	✓	✓	✓[1]	✓	✓	✓	✓	45		✓	✓	✓	
Intel® Xeon® L3406	2.26	2.53/2.53	4	2/4		✓		✓	✓			✓	30		✓	✓	✓	
Intel® Core™ i5-680	3.6	3.73/3.86	4	2/4		✓	✓	✓	✓			✓	73	✓[5]	✓	✓	✓	✓
Intel® Core™ i5-670	3.46	3.6/3.73	4	2/4		✓	✓	✓	✓			✓	73	✓[5]	✓	✓	✓	✓
Intel® Core™ i5-661[8]	3.33	3.46/3.6	4	2/4		✓	✓	✓	✓			✓	87	✓[5]	✓			✓
Intel® Core™ i5-660	3.33	3.46/3.6	4	2/4		✓	✓	✓	✓			✓	73	✓[5]	✓	✓	✓	✓
Intel® Core™ i5-650	3.2	3.33/3.46	4	2/4		✓	✓	✓	✓			✓	73	✓[5]	✓	✓	✓	✓
Intel® Core™ i3-550	3.2	0/0	4	2/4		✓	✓	✓	✓			✓	73		✓			✓
Intel® Core™ i3-540	3.06	0/0	4	2/4		✓	✓	✓	✓			✓	73		✓			✓
Intel® Core™ i3-530	2.93	0/0	4	2/4		✓	✓	✓	✓			✓	73		✓			✓
Intel® Pentium® G6950	2.8	0/0	3	2/2		✓		✓	✓			✓	73		✓			✓
Intel® Celeron® G1101 (Off-roadmap)	2.26	0/0	2	2/2		✓		✓	✓			✓[6]	73		✓			✓[7]

2. Memory support

Platform	DIMM Configuration	Intel® Xeon® 3400 Series Processors	Clarkdale Processors	Intel® Xeon L3406 Processor
Intel® 3400 and 3420 Chipset (Ibex Peak Server)	UDIMM Non-ECC Only	Not Supported	Not Supported	Not Supported
	UDIMM ECC Only	Supported	Supported	Supported
	UDIMM Mix ECC with Non-ECC	Not Supported	Not Supported	Not Supported
	RDIMM ECC Only	Supported	Not Supported	Not Supported

3.   Power and Data-access LED

Lettering	Symbol	Function	Color	Signaling
PWR	⏻	Power status	Green	Off – No power, system off. On – Power good, system on.
Data Access	🗄	Data Access	Red	Off – no data access through IDE or SATA channel On – data is in transition through IDE or SATA channel

4.   Ethernet LED

Label	Color	Indication	Status
ACT/LINK	**Green Or Others**	**On**	1. The Ethernet port is receiving power. 2. Good linkage between the Ethernet port and its supporting hub.
		Off	1. The adapter and switch are not receiving power. 2. No connection between both ends of network cable. 3. The drivers of Ethernet have not been loaded or does not function correctly.
	Green Or Others	**Flashing**	The adapter is sending or receiving network data. The frequency of the flashes varies with the amount of network traffic.
SPEED	**Yellow**	**On**	ACT/LNK LED must on then this LED show the operating at 1000 Mbps. If ACT/LINK is off and this function will be disable.
	Green	**On**	ACT/LNK LED must on then this LED show the operating at 100 Mbps. If ACT/LINK is off and this function will be disable.
		Off	ACT/LNK LED must on then this LED show the operating at 10 Mbps. If ACT/LINK is off and this function will be disable.

Copper Ethernet Interface

Fiber/SFP Ethernet Interface
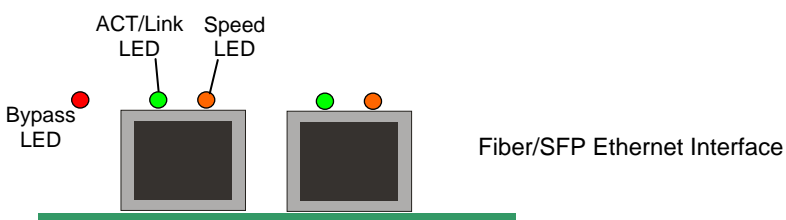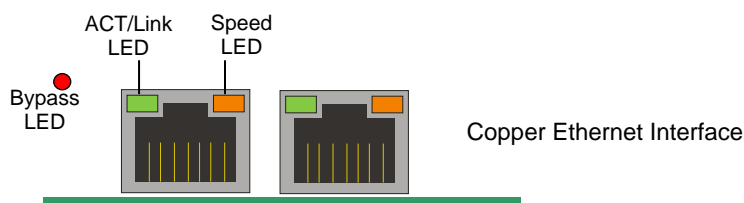
5.   Bypass LED

LED Status	green	red	off
Bypass Mode/Status	normal mode	bypass mode, triggered by WDT expiring	power off, in normal or bypass mode which is defined by customer

Chapter 2 Getting Started

This section describes how the hardware installation and system settings should be done.

2.1 Included Hardware

The following hardware is included in package:

◆ CAR-4003 Communication Appliance System Board
◆ One null serial port cable

2.2 Before You Begin

To prevent damage to any system board, it is important to handle it with care. The following measures are generally sufficient to protect your equipment from static electricity discharge:

When handling the board, use a grounded wrist strap designed for static discharge elimination and touches a grounded metal object before removing the board from the antistatic bag. Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

When handling processor chips or memory modules, avoid touching their pins or gold edge fingers. Restore the communications appliance system board and peripherals back into the antistatic bag when they are not in use or not installed in the chassis.

Some circuitry on the system board can continue operating even though the power is switched off. Under no circumstances should the Lithium battery cell used to power the real-time clock be allowed to be shorted. The battery cell may heat up under these conditions and present a burn hazard.

WARNING!

1. **"CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS"**

2. **This guide is for technically qualified personnel who have experience installing and configuring system boards. Disconnect the system board power supply from its power source before you connect/disconnect cables or install/remove any system board components. Failure to do this can result in personnel injury or equipment damage.**

3. **Avoid short-circuiting the lithium battery; this can cause it to superheat and cause burns if touched.**

4. **Do not operate the processor without a thermal solution. Damage to the processor can occur in seconds.**

5. **Do not block air vents. Minimum 1/2-inch clearance required.**

2.3.1 CAR-4003 System Board Jumper

In general, jumpers on CAR-4003 system board are used to select options for certain features. Some of the jumpers are configurable for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (Short) or remove (NC) it from the jumper pins according to the following instructions. Here NC stands for "Not Connected".

Jumper settings and connector functions

Jumper setting
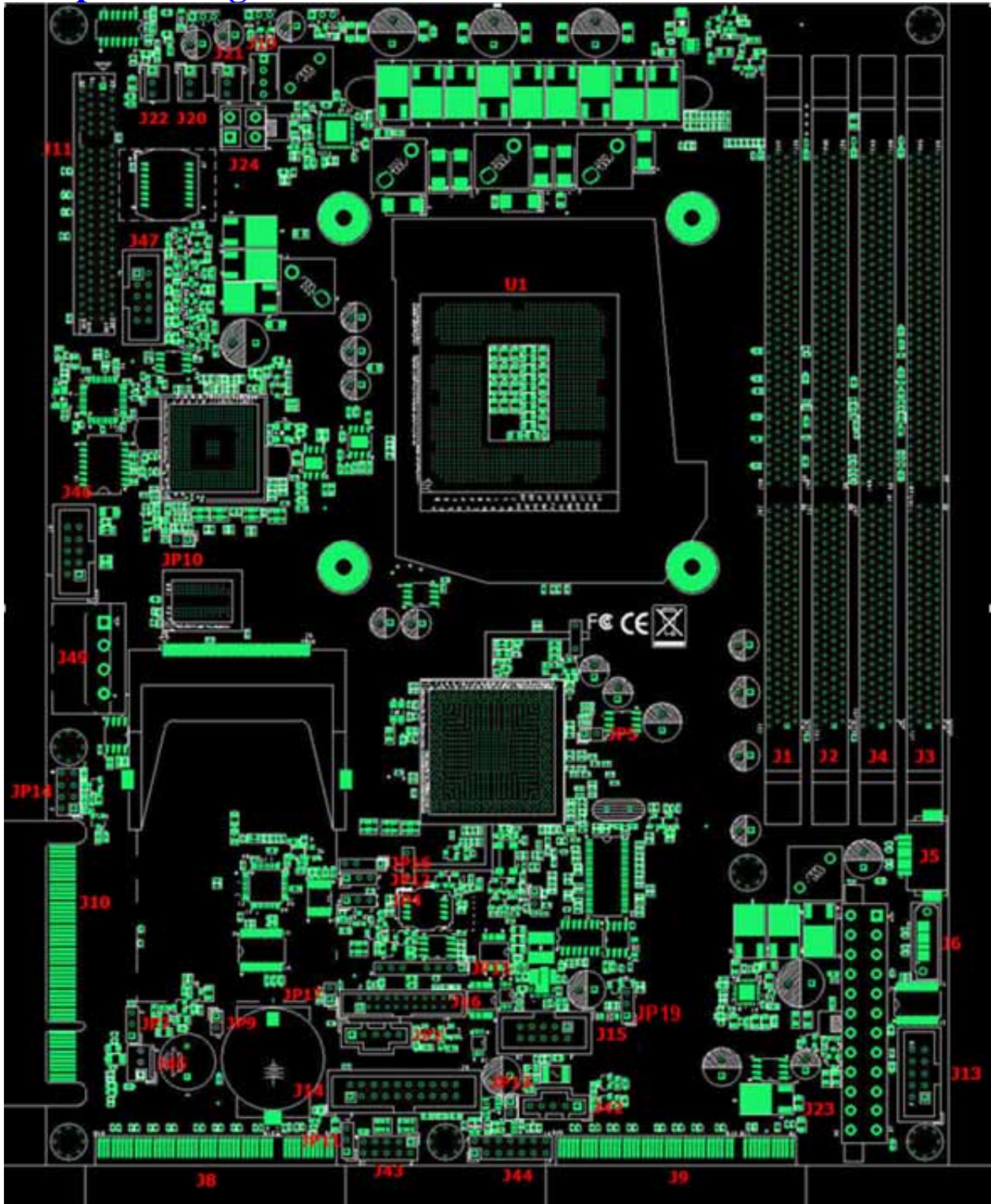
(default setting:"★")

Reference Designator	Function
JP4	CMOS clear
JP7	PCIE MUX selection
JP9	Case open
JP10	IPMI enable/disable
JP11	GPIO header supply voltage
JP12	PCIe lanes width selection
JP13	WDT# enable/disable
JP17	ICMB & IPMI Debug Port Switch Connector
JP19	Auto Power On (traditional/always on)

JP4:CMOS clear

JP4	Function
1-2 Short	No operation ★
2-3 Short	Clear CMOS

JP7:PCIe MUX selection

JP7	Function
1-2 Short	Two PCIe x 4 on J10 (PCIe golden finger)★
2-3 Short	One PCIe x4 on J11 (PCIe Slot) One PCIe x 4 on J10 (PCIe golden finger)

JP9: Case Open Function

JP9	Function
1-2 Short	Case Open
1-2 Open	No Case open ★
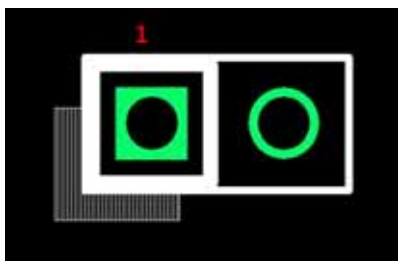
JP10: IPMI enable or disable

JP10	Function
1-2 Short	Disable IPMI
1-2 Open	Enable IPMI ★
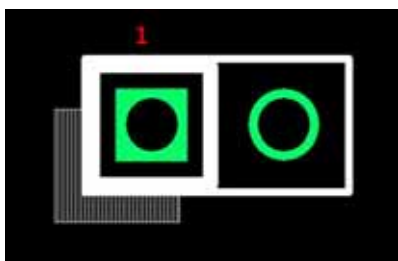
JP11:GPIO header supply voltage

JP11	Function
1-2 Short	5V
2-3 Short	3.3V ★

JP12:PCIe lanes width selection

JP12	Function
1-2 Short	2x8
2-3 Short	4x4 ★

JP13:WDT# enable/disable

JP13	Function
1-2 Short	Enable WDTO# ★ (controlled by PCH GPIO32)
1-2 Open	Disable WDTO#
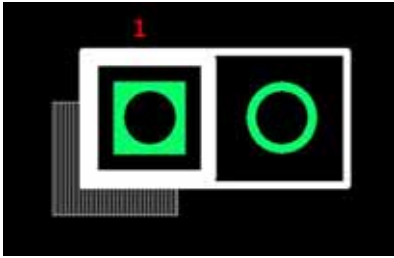
JP17: ICMB & IPMI Debug Port Switch Connector

JP13	Function
1-2 Short	Switch to ICMB function. (default) ★
1-2 Open	Switch to IPMI Debug Port function.
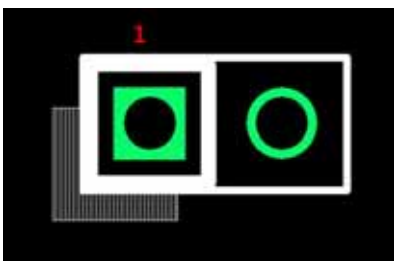
JP19: Auto Power On Connector

JP19	Function
1-2 Short	Enable auto power on function. (default), generate power button pulse only one time.
2-3 Short	Enable auto power on function (always on), generate repeated power button pulses, until PSU is on, it can power on the system no matter AC loss at any period.
open	Disable auto power on function
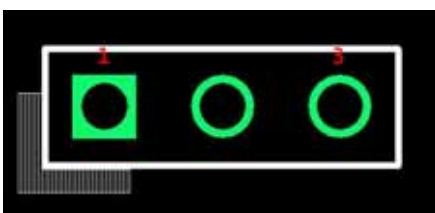
For F5 customer: Please let JP19 2-3 short
P/N : AB3-3048, AB3-3049

Connector Function

Connector	Function	Remark
U1	CPU socket	
J1	Memory channel A, DIMM1(black)	Secondary
J2	Memory channel A, DIMM0(Blue)	Primary
J4	Memory channel B, DIMM1(black)	Secondary
J3	Memory channel B, DIMM0(Blue)	Primary
J5,J6	SATA connector	
J8,J9	x8 PCIe connector	
J10	x8 PCIe golden finger	
J11	x8 PCIe connector (x4 PCIe signals is supported only)	
J12	CF connector	
J13	COM2 connector (for EZIO)	
J14	USB/COM1 combo	
J15	USB connector	
J16	TPM connector	
J19	CPU FAN connector	
J20,J21,J22	SYS FAN connector (rear side)	
J23	24-pin ATX power connector	
J24	+12V power connector for CPU	
J42,JP2	SMbus connector for reading power status	
J43	8-bit GPIO connector	
J44	PWR & HDD LED, PWR ON, REST, LDF	
J45	SYS FAN connector (front side)	
J46	IPMI LAN connector	
J47	VGA connector	
J48	Aux power connector	
JP14	IPMB & ICMB Connector	
JP15	PLD Chip Program Connector	
JP16	IPMI Debug Port Connector	

J5, J6: SATA Connector PIN definition

Pin	Signal Name	Pin	Signal Name
1	GND	2	SATA_TX_P
3	SATA_TX_N	4	GND
5	SATA_RX_N	6	SATA_RX_P
7	GND		
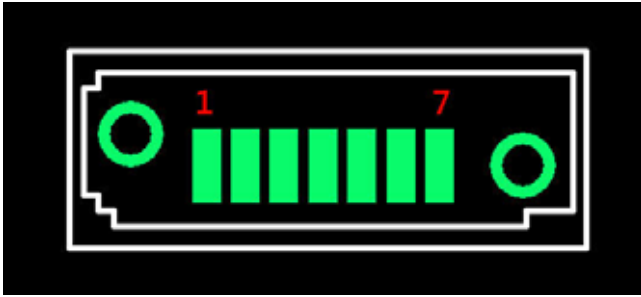
J13: COM port connector for EZIO function

Pin	Signal Name	Pin	Signal Name
1	DCD#2	2	DSR#2
3	RXD#2	4	RTS#2
5	TXD#2	6	CTS#2
7	DTR#2	8	RI#2
9	GND	10	NC
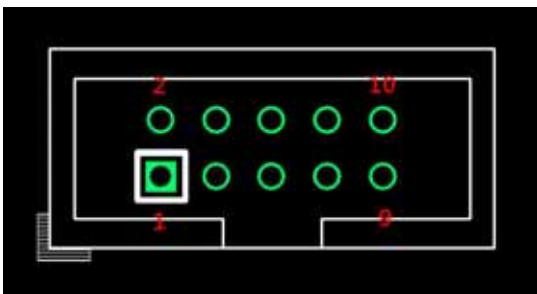
J14: USB & RS232 Combo Connector

Pin	Signal Name	Pin	Signal Name
1	DCD#1	2	DSR#1
3	RXD#1	4	RTS#1
5	TXD#1	6	CTS#1
7	DTR#1	8	RI#1
9	GND	10	NC
11	GND	12	VCC_USB
13	GND	14	USB0-
15	USB1+	16	USB0+
17	USB1-	18	GND
19	VCC_USB	20	GND
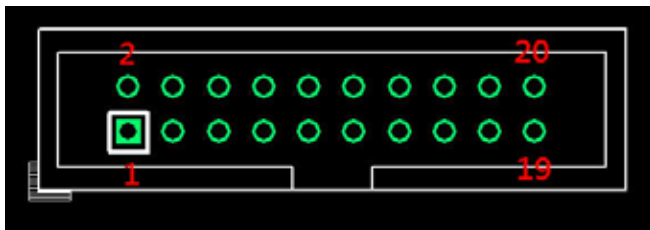
J15: PIN definition

Pin	Signal Name	Pin	Signal Name
1	GND	2	VCC_USB
3	GND	4	USB2-
5	USB3+	6	USB2+
7	USB3-	8	GND
9	VCC_USB	10	GND
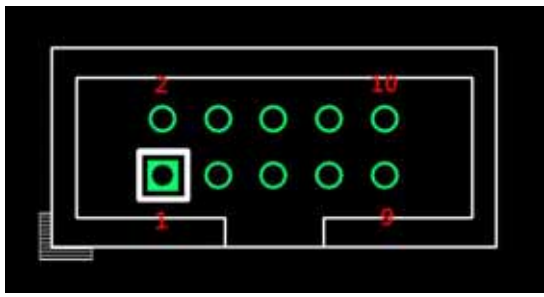
J16: TPM Connector

Pin	Signal Name	Pin	Signal Name
1	PCLK_FWH	2	GND
3	LFRAME#	4	NC
5	FWH_RST#	6	VCC
7	LAD3	8	LAD2
9	V3P3	10	LAD1
11	LAD0	12	GND
13	NC	14	NC
15	3VSB	16	SERIRQ
17	GND	18	GND
19	LPCPD#	20	LDRQ#1
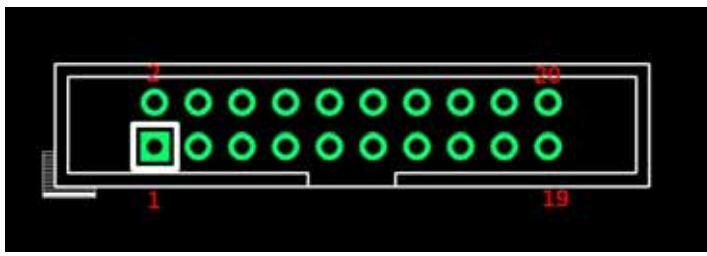
J19: CPU FAN connector

Pin	Signal Name	Pin	Signal Name
1	GND	2	+12V
3	CPUFANIN0	4	NC
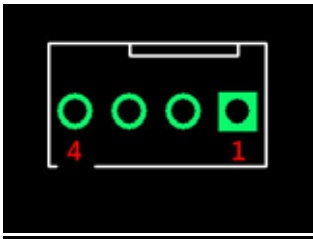
J20: System FAN Connector

Pin	Signal Name
1	GND
2	+12V
3	SYSFANIN
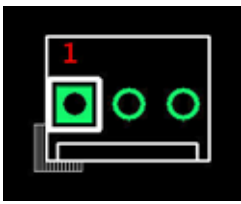
J21: System FAN Connector

Pin	Signal Name
1	GND
2	+12V
3	CPUFANIN1
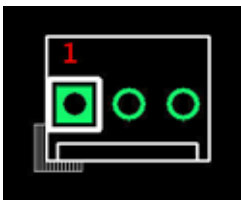
J22, J45: System FAN Connector

Pin	Signal Name
1	GND
2	+12V
3	NC
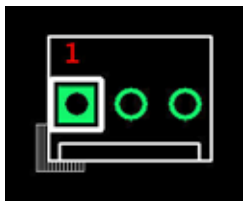
J23: ATX Power connector

Pin	Signal Name	Pin	Signal Name
1	V3P3	2	V3P3
3	GND	4	VCC
5	GND	6	VCC
7	GND	8	ATX_PWROK
9	5VSB	10	+12V
11	+12V	12	V3P3
13	V3P3	14	-12V
15	GND	16	PS_ON-
17	GND	18	GND
19	GND	20	NC
21	VCC	22	VCC
23	VCC	24	GND
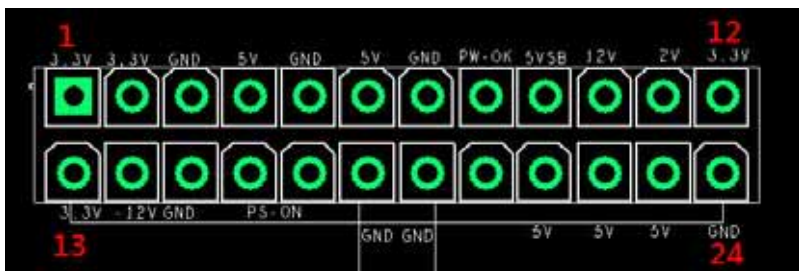
J24: Auxiliary Power Connector

Pin	Signal Name
1	GND
2	GND
3	VCC12_PS
4	VCC12_PS
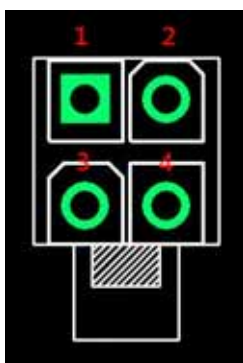
J42, JP2: Read Power Status Connector PIN definition

Pin	Signal Name
1	SMBCLK
2	SMBDAT
3	NC
4	GND

5	VCC3
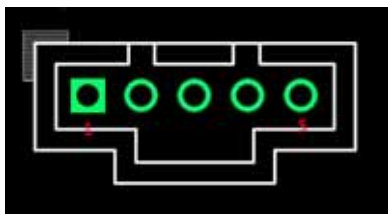
J43: 8-bit GPIO connector definition

Pin	Signal Name	Pin	Signal Name
1	LPC_GP37	2	LPC_GP30
3	LPC_GP36	4	LPC_GP31
5	LPC_GP35	6	LPC_GP32
7	LPC_GP34	8	LPC_GP33
9	GND	10	+5V or +3.3V
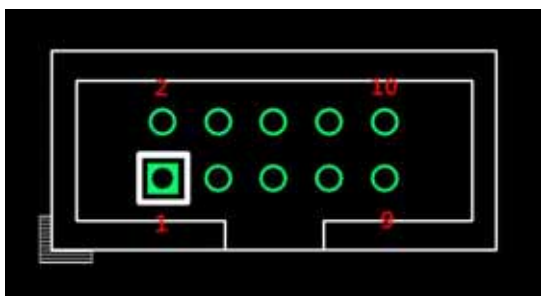
J44: Combo Connector

Pin	Signal Name	Pin	Signal Name
1	VCC	2	VCC
3	HDD_LED	4	GND
5	GND	6	OPMA_LOCAL_LOCK_N
7	SYS_RST_N	8	PWRBTN_N
9	DEFAULT#	10	GND
11	3VSB	12	3VSB
13	2050_CHASSIS_ID_N	14	2050_FAULT_LED_N

Pin	Function
1-3	HDD LED
2-4	Power LED
5-7	Reset Button
6-8	Power button
9-10	Restore to default
11-13	Chassis identification LED
12-14	Fail LED
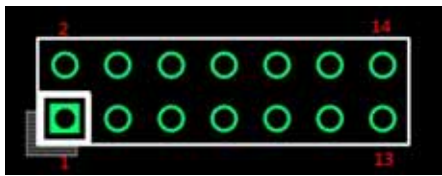
J46: IPMI LAN Connector

Pin	Signal Name	Pin	Signal Name
1	8201_RX+	2	8201_RX-
3	8201_TX+	4	8201_TX-
5	VCC3P3_AUX	6	VCC3P3_AUX
7	LED0_PHYAD0	8	LED1_PHYAD1
9	LAN_GND_EARTH1	10	GND
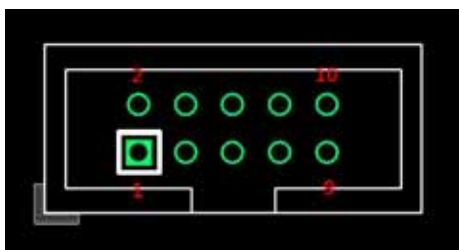
J47: VGA Connector

Pin	Signal Name	Pin	Signal Name
1	VGA_RED	2	VGA_CLK
3	VGA_GREEN	4	GND
5	VGA_BLUE	6	VGA_SDA
7	VGA_VSYNC	8	GND
9	VGA_HSYNC	10	NC
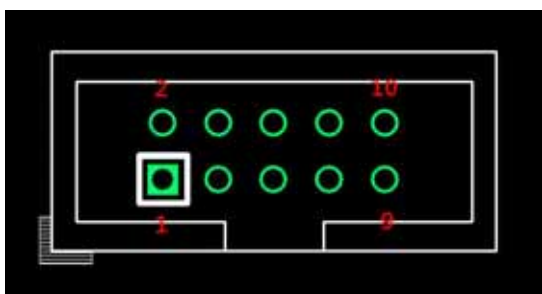
J48: Auxiliary Power Connector for Hard Disk

Pin	Signal Name
1	+12V
2	GND
3	GND
4	VCC

JP14: **IPMB & ICMB Connector**

Pin	Signal Name	Pin	Signal Name
1	IPMB_5VSB_SMBDAT	2	GND
3	IPMB_5VSB_SMBCLK	4	GND
5	R_ICMB_485D_N	6	GND
7	R_ICMB_485D_P	8	GND
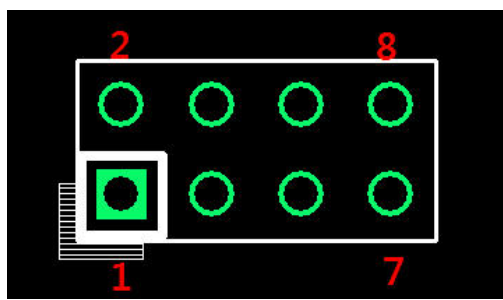
JP15: **PLD Chip Program Connector**

Pin	Signal Name
1	VCC3P3_AUX
2	TDO
3	TDI
4	NC
5	NC
6	TMS
7	GND
8	TCK

JP16: **IPMI Debug Port Connector**

Pin	Signal Name
1	GND
2	NC
3	BMC_RXD2
4	BMC_TXD2
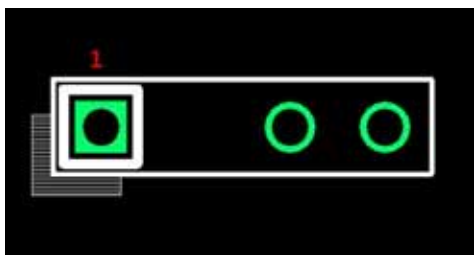
2.4 The Chassis

The system is integrated in a customized 1U chassis (*Fig. 2-1, Fig. 2-2*). On the front panel you will find, six LAN ports, two USB ports and a COM port.

CAR-4003

Fig. 2-1 *Front view of the chassis*

Fig. 2-2 *Rear view of the chassis*

2.5 Open the Chassis

1. Loosen the 6 screws of the chassis, two on each side and the rest two on the back, to remove the top lead (*Fig. 2-3*).
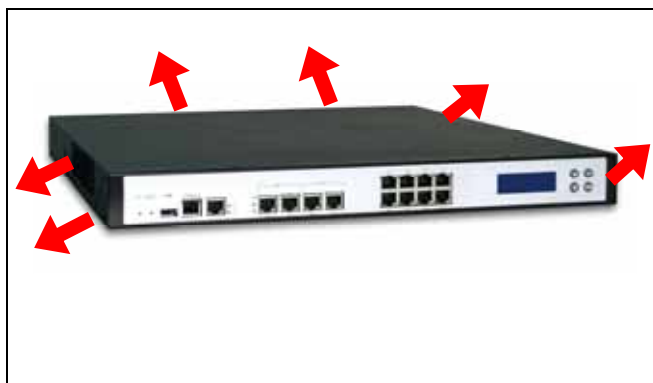
Fig. 2-3 *Take off screws*

2. The top lead (*Fig. 2-4*) can be removed from the base stand (*Fig. 2-5*).

Fig. 2-4 *The top lead*

Fig. 2-5 *The base stand*

2.6   Install a Different Processor

To install a CPU

1. Local the CPU socket on the motherboard
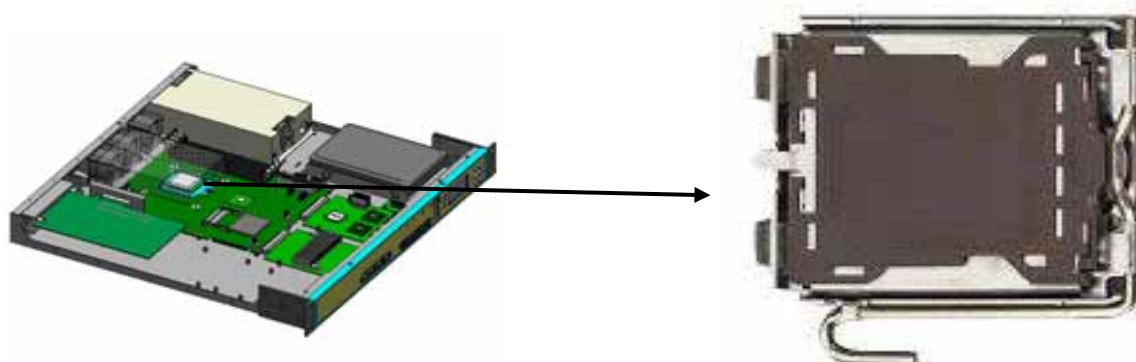
CPU socket 1156

Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

2. Press the load lever with your thumb (A), then move it to left (B) until it is released
   from the retention tab

Retention tab

Load lever

PnP cap

This side of the
socket box should
face you.
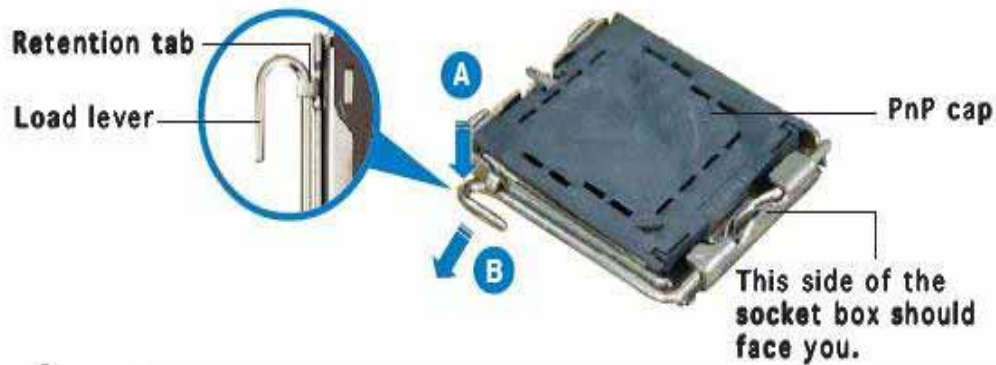
To prevent damage to the socket pins, do not remove the PnP cap
unless you are installing a CPU.

3. Lift the load lever in the direction of the arrow to a 135° angle
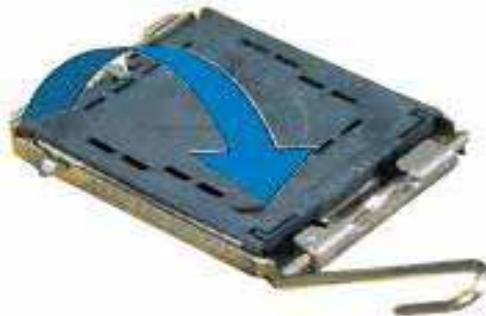
4. Lift the load plate with your thumb and forefinger to a 100° angle (A), then push the PnP
   cap from the load plate window to remove (B)
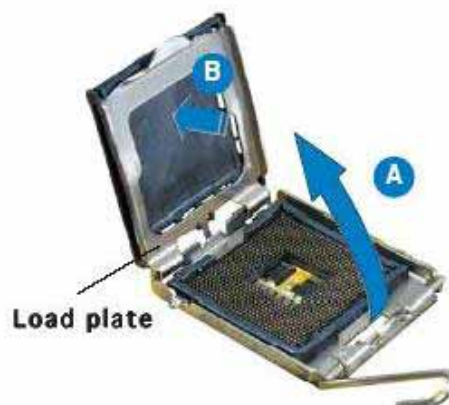
Load plate

5. Position the CPU over the socket, making sure that the gold triangle is on the bottom-left
   corner of the socket. The socket alignment key should fit into the CPU notch

Alignment key

Gold triangle mark
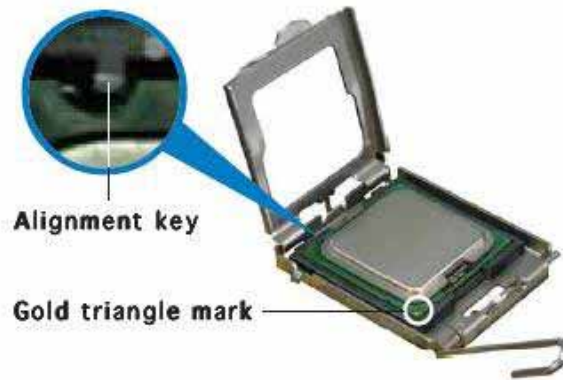
6. Close the load plate (A), then push the load lever (B) until it snaps into the retention tab

The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

Configure Processor Speed

The system was designed to self-detect its CPU speed. So it does not require any system adjustment.

2.7   Remove and Install DIMM

Follow these steps to upgrade RAM module:

Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Installs DIMM based on the Slot order

Slot 2

Slot 4

Slot 1

Slot 3
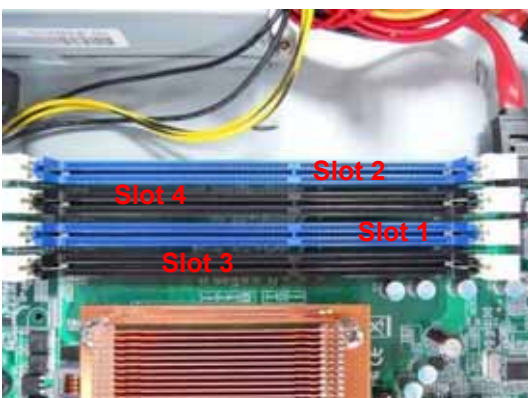
2. Unlock a DIMM socket by pressing the retaining clips outward

3. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket

② DDR DIMM notch

① ①

Unlocked retaining clip
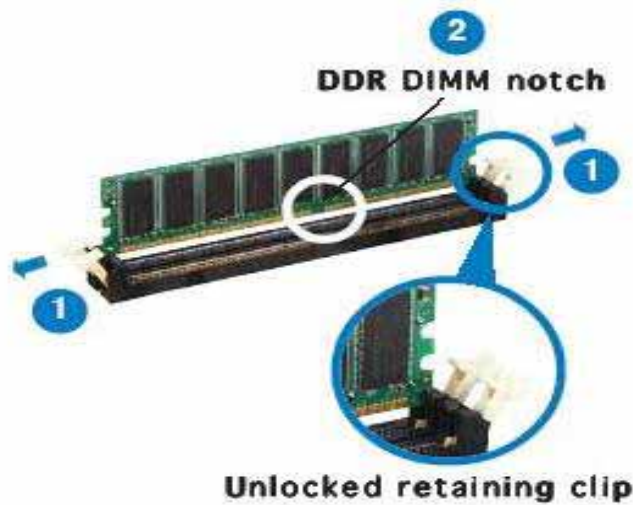
A DDR DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

4. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated

Locked Retaining Clip
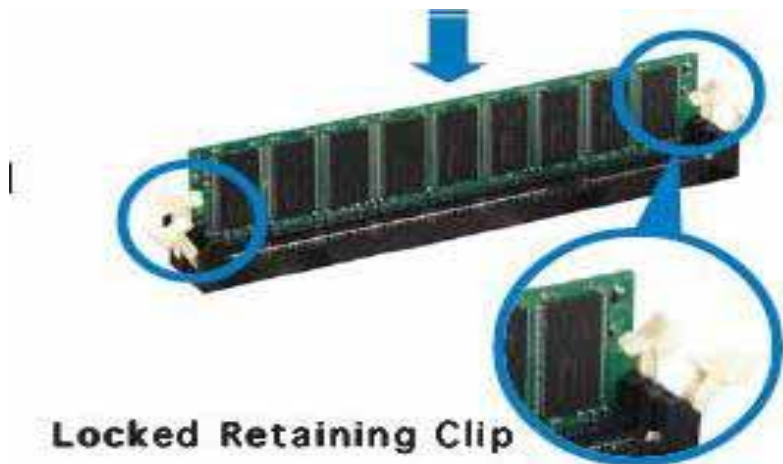
Follow these steps to remove a DIMM:

1. Simultaneously press the retaining clips outward to unlock the DIMM

DDR DIMM notch
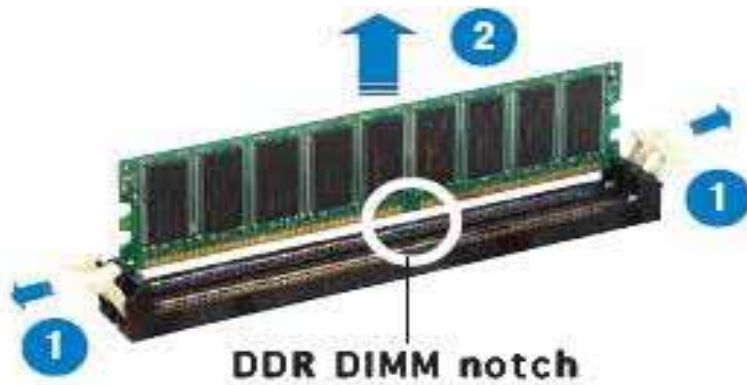
2. Remove the DIMM from the socket

2.8   Remove and Install Compact Flash Card

1. Insert the Compact Flash Card into the CF interface

Compact Flash Card

Insert Compact Flash Card into the CF interface

2. The completed installation of Compact Flash Card is shown as

Completion of Compact Flash Card connection

2.9   Remove and Install Battery

1. Press the metal clip back to eject the button battery

2. Replace it with a new one by pressing the battery with fingertip to restore the battery

Eject the battery   *Restore the battery*

2.10 Install HDD

The system has an internal drive bay for one 3.5" SATA hard disk drive. If the HDD is not pre-installed, you can install it by yourself. Follow the steps below to install the HDD:

3.5"HDD Kit

Fix the hard disk drive on the HDD Bracket with four screws.

Fix the hard disk drive on the HDD Bracket with four screws.

Fasten the two screws to lock Hard disk fixed plate and chassis, Connect Power cable and HDD cable to CAR-4003 system board

2.11 Install Manager board
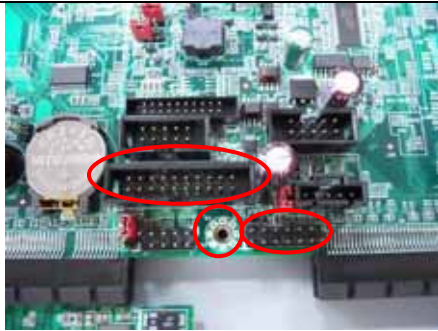
Install Manager board control Cable and Manager board GND Cable	Manager board control Cable and Manager board GND Cable link to system board
Install IPMI control Cable	IPMI control Cable link to system board
Manager board control Cable, IPMI control Cable and Manager board GND Cable link to chassis	Install manager board finish
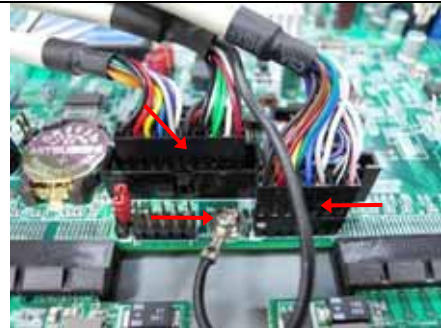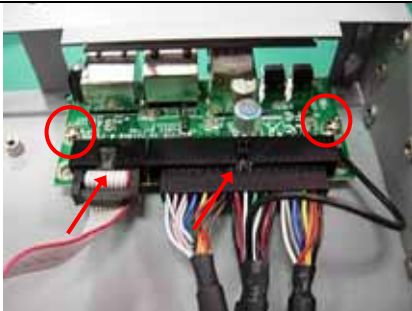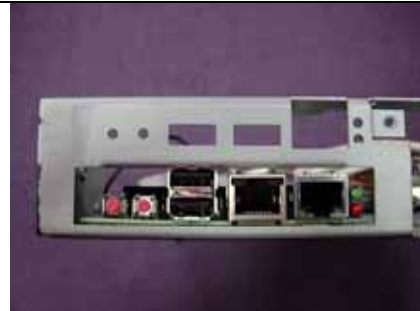
2.12   Install ABN-Card link to Slot A or B
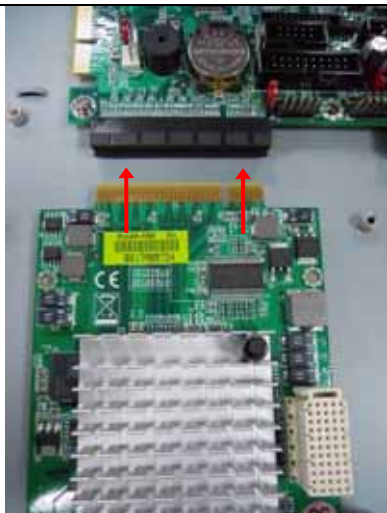
Install ABN-Card	Fix the ABN-Card on the chassis with four screws.
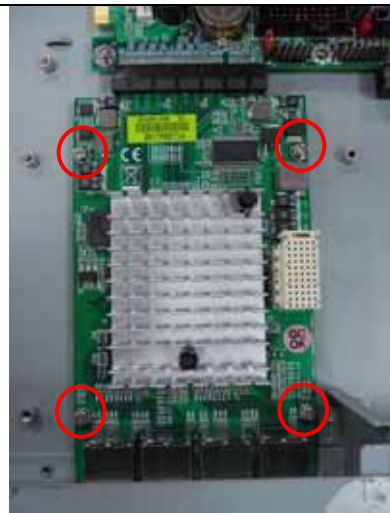
Install Slot C link to Riser Card

Install ABN-Card link to Slot C
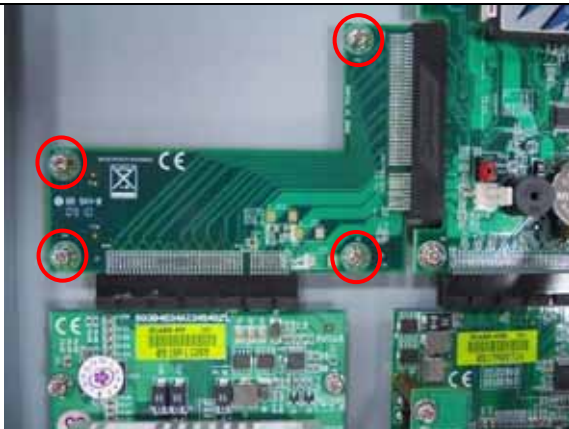
Fix the Riser Card on the chassis with four screws.

Fix the ABN-Card on the chassis with four screws.

2.14 Ear Mount Kit Installation

The CAR-4003 series shipped with 2 ear mount kits. The following is the installation instruction of these ear mounts:

1. Take out the L shape ear mount kits. One ear mount fits on one side of the chassis,

2. Placing the side with four holes agonists the chassis and the side with two holes face outward.

3. Fasten five screws on each side
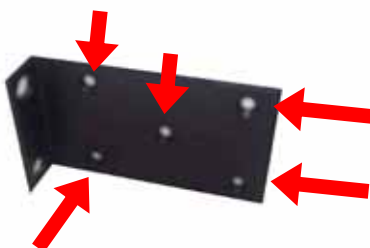
2.15   Remove EZIO / LCD

The CAR-4003 series support EZIO modules. The following is the remove instruction of these EZIO/LCD modules:

1. Remove all cables from EZIO

Fig.2-14   *Remove the cable from EZIO*   **Fig.2-15**   *After remove the cable from EZIO*

2. Remove the screws from chassis.
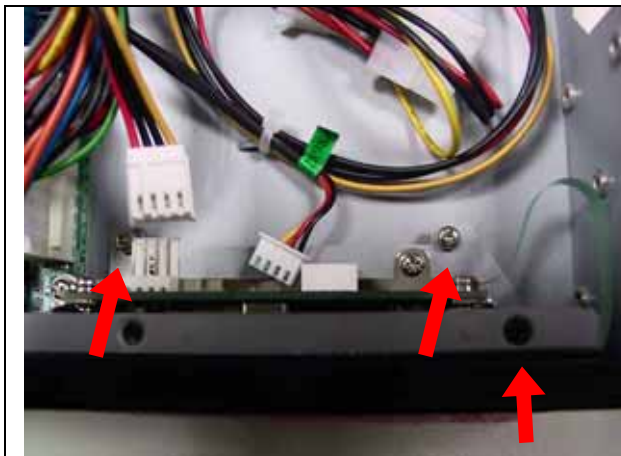
Fig.2-16   *Remove the screws from EZIO*   **Fig.2-17**   *Remove screws from chassis.*

EZIO

Remove Power Supply

The following is the remove step instruction of power supply.

1. Remove all power cables from main board.
2. Remove the screws from PSU
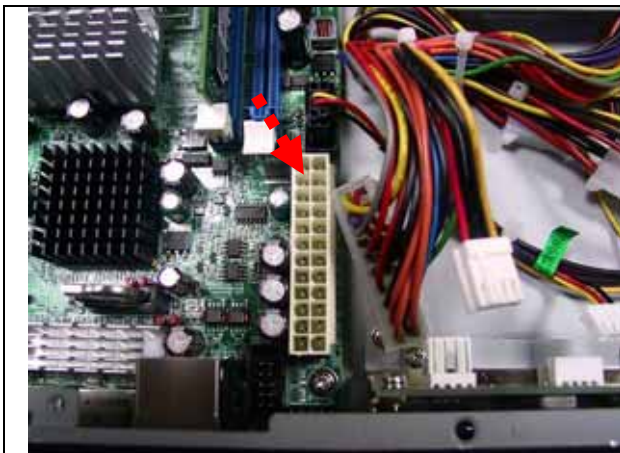
Remove all cables from board

Remove all cables from board
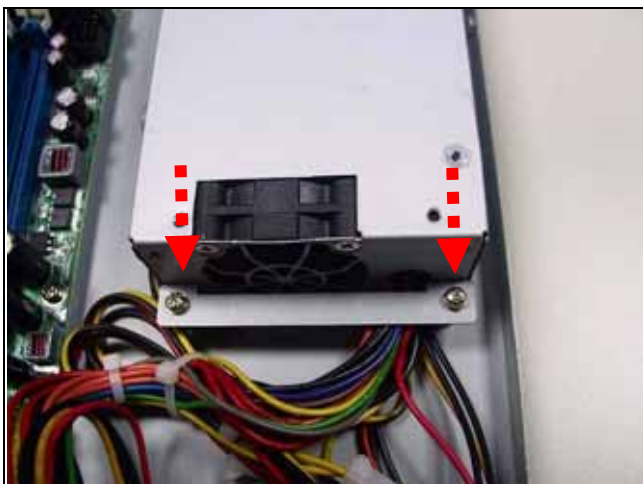
Remove the screws from PSU

Remove the screws from PSU

Complete remove power supply

2.17 Remove main board

The following is the remove step instruction of main board.

1. Remove all cables and heatsink from main board.

2. Remove all screws from main board.

Remove all cables and heatsink from main board
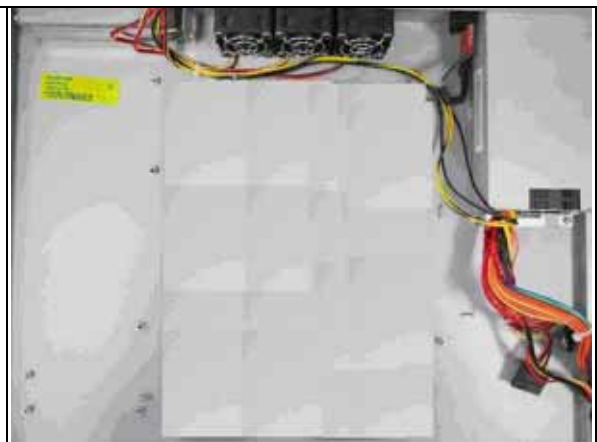
Complete remove main board

2.18 Use a Client Computer

Connection Using Hyper Terminal

If users use a headless CAR-4003 system, which has no mouse/keyboard and VGA output connected to it, the console may be used to communicate with CAR-4003.

To access CAR-4003 via the console, Hyper Terminal is one of many choices. Follow the steps below for the setup:

Note: Terminal software may need to update for correct console output.

1. Execute HyperTerminal under C:\Program Files\Accessories\HyperTerminal
2. Enter a name to create new dial
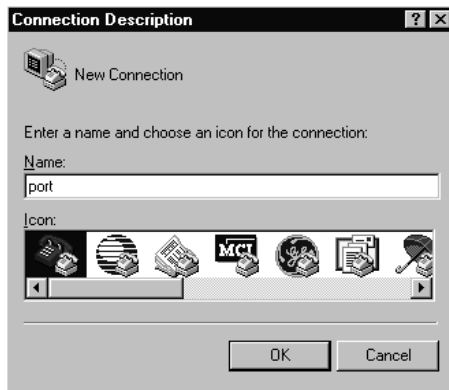
3. For the connection settings, make it Direct to Com1.
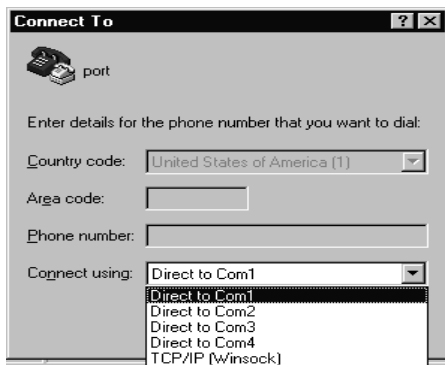
4. Please make the port settings to Baud rate 19200, Parity None, Data bits 8, Stop bits 1
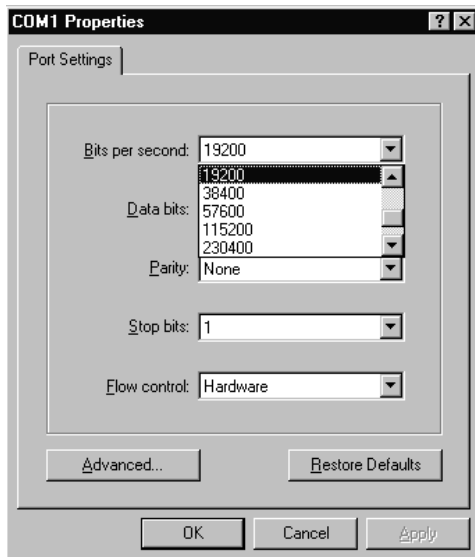
5. Turn on the power of CAR-4003 system, after following screen was shown:
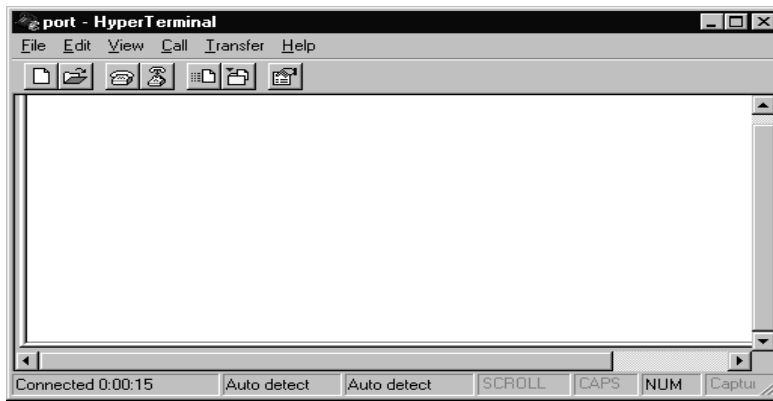
6. You can then see the boot up information of CAR-4003.
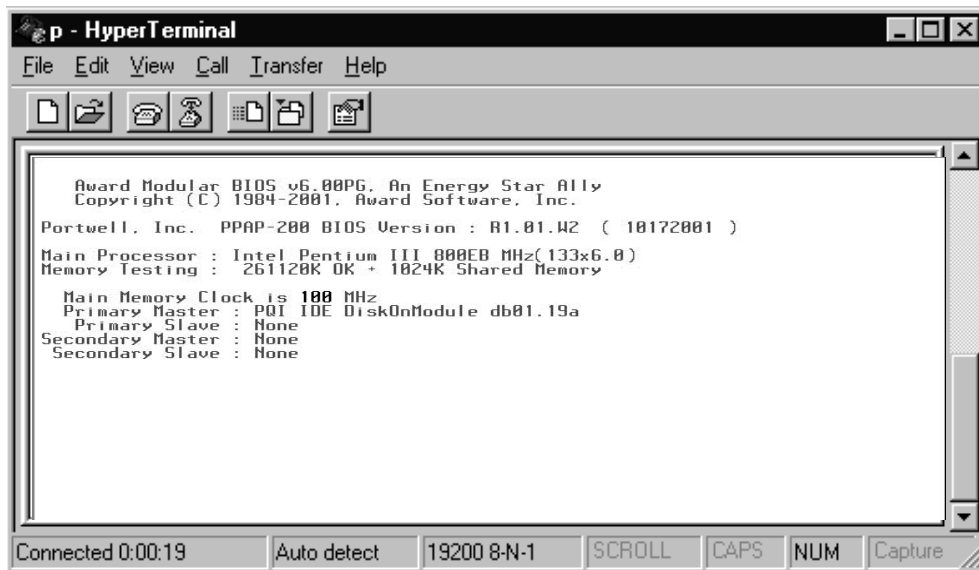
7. When message "Hit <DEL> if you want to run Setup" appear during POST, after turning on or rebooting the computer, press **<Tab>** key *immediately* to enter BIOS setup program.

This is the end of this section. If the terminal did not port correctly, please check the previous steps.

Chapter 3 BIOS Setting

3.1   BIOS Setup Information

Power on the system, press the <Del> to run BIOS setup. After you press the <Delete> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.
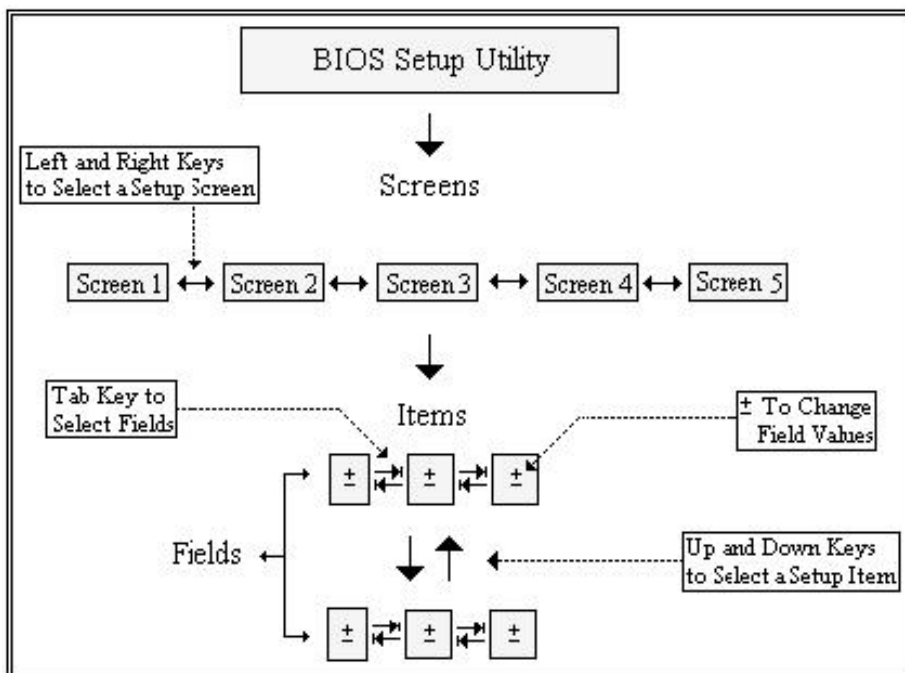
Control Keys

Key	Function
↑↓ Up /Down	The *Up and Down* <Arrow> keys allow you to select a setup item or sub-screen.
→ ← Left/Right	The *Left and Right* <Arrow> keys allow you to select a setup screen. For example: Main screen, Advanced screen, Chipset screen, and so on.
+ - Plus/ Minus	The *Plus and Minus* <Arrow> keys allow you to change the field value of a particular setup item. For example: Date and Time.
Tab	The <Tab> key allows you to select setup fields.

Hot Key	Description
F1	The \<F1\> key allows you to display the *General Help screen*. Press the \<F1\> key to open the *General Help screen*. **General Help** ↔ Select Screen ↓↑ Select Item + - Change Screen Enter Go to Sub Screen PGDN Next Page PGUP Previous Page Home Go to Top of the Screen End Go to Bottom of Screen F2/F3 Change Colors F7 Discard Changes F8 Load Failsafe Defaults F9 Load Optimal Defaults F10 Save and Exit ESC Exit [Ok]
F10	The \<F10\> key allows you to save any changes you have made and exit Setup. Press the \<F10\> key to save your changes. The following screen will appear: Save configuration changes and exit now? [Ok] [Cancel] Press the \<Enter\> key to save the configuration and exit. You can also use the \<Arrow\> key to select *Cancel* and then press the \<Enter\> key to abort this function and return to the previous screen.
ESC	The \<Esc\> key allows you to discard any changes you have made and exit the Setup. Press the \<Esc\> key to exit the setup without saving your changes. The following screen will appear: Discard changes and exit setup now? [Ok] [Cancel] Press the \<Enter\> key to discard changes and exit. You can also use the \<Arrow\> key to select *Cancel* and then press the \<Enter\> key to abort this function and return to the previous screen.
Enter	The \<Enter\> key allows you to display or change the setup option listed for a particular setup item. The \<Enter\> key can also allow you to display the setup sub- screens.

Main Menu

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the *Main* tab. There are two Main Setup options. They are described in this section.

```
Main      Advanced    PCIPnP    Boot    Security    Chipset    Exit
*****************************************************************
* System Overview                         * Use [ENTER], [TAB]
* *************************************** * or [SHIFT-TAB] to
* AMIBIOS                                  * select a field.
* Version   :08.00.14                      *
* Build Date:03/15/07                      * Use [+] or [-] to
* ID        :PPAP3755                      * configure system Time.
*                                          *
* Processor                                *
* Intel(R) Core(TM)2 CPU      6400  @ 2.13GHz *
* Speed     :2133MHz                        *
* Count     :2                              *
*                                          *
* System Memory                            * *    Select Screen
* Size      :504MB                          * **   Select Item
*                                          * +-   Change Field
* System Time              [19:14:45]       * Tab  Select Field
* System Date              [Mon 04/30/2007] * F1   General Help
*                                          * F10  Save and Exit
*                                          * ESC  Exit
*                                          *
*****************************************************************
        v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```

System Date / Time
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

➢ Advanced BIOS Setup
Select the *Advanced* tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages.

```
Main      Advanced    PCIPnP    Boot    Security    Chipset    Exit
*****************************************************************
* Advanced Settings                        * Configure CPU.
* *************************************** *
* WARNING: Setting wrong values in below sections *
*          may cause system to malfunction. *
*                                          *
* * CPU Configuration                      *
* * IDE Configuration                      *
* * SuperIO Configuration                  *
* * Hardware Health Configuration          *
* * ACPI Configuration                     *
* * APM Configuration                      *
* * MPS Configuration                      *
* * PCI Express Configuration              * *    Select Screen
* * Smbios Configuration                   * **   Select Item
* * Remote Access Configuration            * Enter Go to Sub Screen
* * USB Configuration                      * F1   General Help
*                                          * F10  Save and Exit
*                                          * ESC  Exit
*                                          *
*****************************************************************
        v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```

➢ IDE Configuration Setup
From the IDE Configuration screen, press <Enter> to access the sub menu. Use the up and down <Arrow> keys to select an item. The settings are described on the following pages.

➢ SUPER IO CONFIGURATION
Super IO Configuration
You can use this screen to select options for the Super I/O settings. Use the up and down
<Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value
of the selected option. The settings are described on the following pages. The screen is
shown below.

➢ REMOTE ACCESS CONFIGURATION
Remote Access Configuration
You can use this screen to select options for the Remote Access Configuration. Use the
up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to
change the value of the selected option. The settings are described on the following
pages. The screen is shown below.

```
          Advanced
*****************************************************************************
* Configure Remote Access type and parameters        * Select Remote Access  *
* *************************************************** * type.                  *
* Remote Access                    [Enabled]          *                       *
*                                                     *                       *
* Serial port number              [COM1]              *                       *
*       Base Address, IRQ         [3F8h, 4]           *                       *
* Serial Port Mode                [19200 8,n,1]       *                       *
* Flow Control                    [None]              *                       *
* Redirection After BIOS POST     [Always]            *                       *
* Terminal Type                   [ANSI]              *                       *
* VT-UTF8 Combo Key Support       [Enabled]           *                       *
* Sredir Memory Display Delay     [No Delay]          *                       *
*                                                     *   *    Select Screen  *
*                                                     *   **    Select Item    *
*                                                     *   +-    Change Option   *
*                                                     *   F1    General Help    *
*                                                     *   F10   Save and Exit   *
*                                                     *   ESC   Exit            *
*                                                     *                       *
*                                                     *                       *
*****************************************************************************
          v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```

Remote Access
You can disable or enable the BIOS remote access feature here.

Serial Port Number
Select the serial port you want to use for console redirection. You can set the value for this option to either *COM1* or *COM2*.

Serial Port Mode
Select the baud rate you want the serial port to use for console redirection.

➢ **USB Configuration**
You can use this screen to select options for the USB Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.


```
          Advanced
*****************************************************************************
* USB Configuration                                   * Enables support for   *
* *************************************************** * legacy USB. AUTO       *
* Module Version - 2.24.0-12.4                        * option disables        *
*                                                     * legacy support if      *
* USB Devices Enabled :                               * no USB devices are     *
*   1 Keyboard, 1 Mouse                               * connected.             *
*                                                     *                       *
* Legacy USB Support              [Enabled]           *                       *
* Port 64/60 Emulation            [Disabled]          *                       *
* USB 2.0 Controller Mode         [HiSpeed]           *                       *
* BIOS EHCI Hand-Off               [Enabled]          *                       *
*                                                     *                       *
*                                                     *   *    Select Screen   *
*                                                     *   **    Select Item     *
*                                                     *   +-    Change Option    *
*                                                     *   F1    General Help     *
*                                                     *   F10   Save and Exit    *
*                                                     *   ESC   Exit             *
*                                                     *                       *
*                                                     *                       *
*****************************************************************************
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```
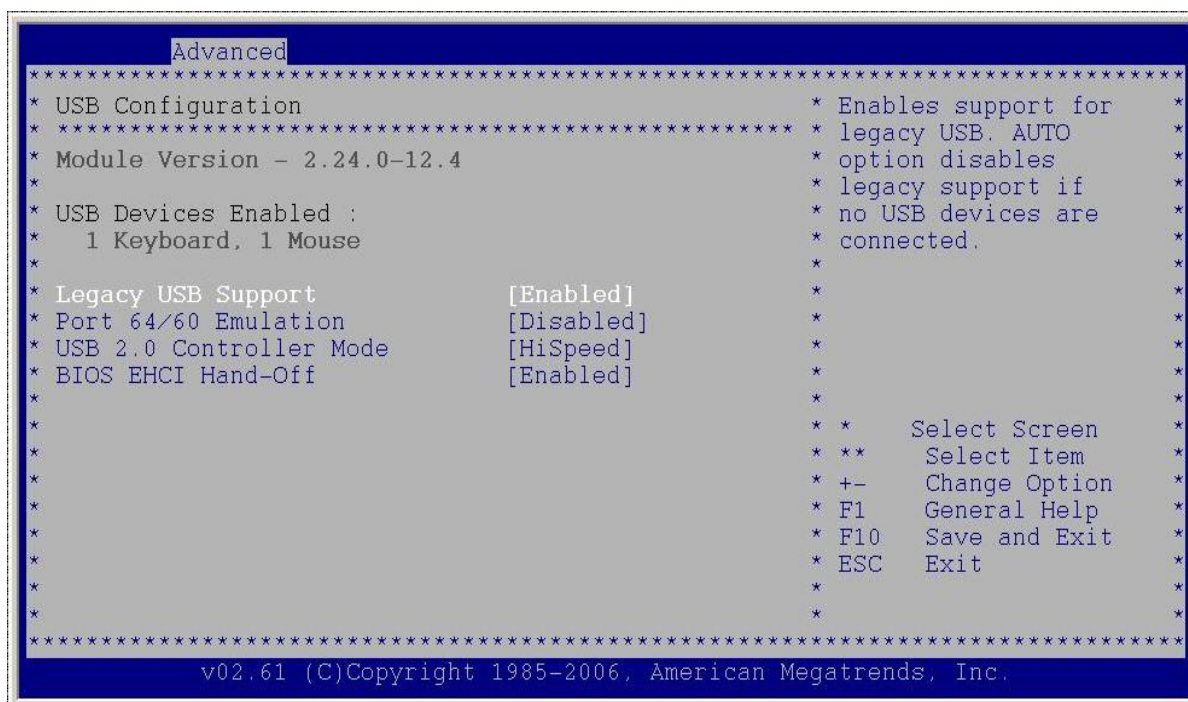
Legacy USB Support
Legacy USB Support refers to the USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB drivers loaded on the system. Set this value to enable or disable the Legacy USB Support. The Optimal and Fail-Safe default setting is *Disabled*.

➢ **CPU Configuration**
You can use this screen to select options for the CPU Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

Note: The CPU Configuration setup screen varies depending on the installed processor.

➢ **Boot Settings**
Select the *Boot* tab from the setup screen to enter the Boot BIOS Setup screen.
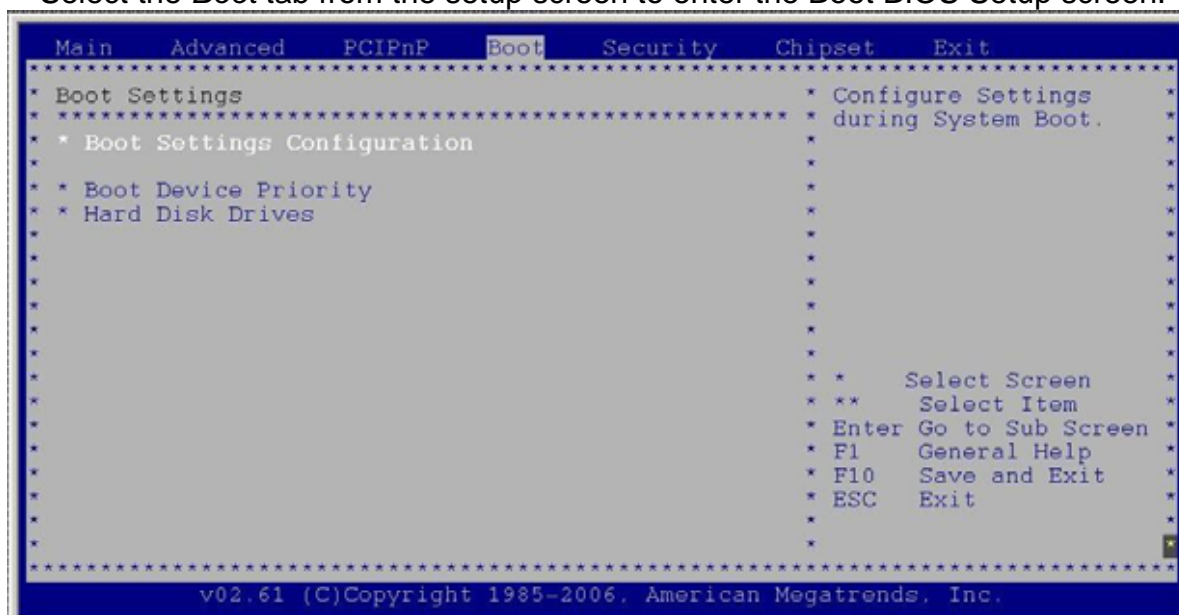
➢ BOOT SETTINGS CONFIGURATION SCREEN
Boot Settings Configuration

Use this screen to select options for the Boot Settings Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.
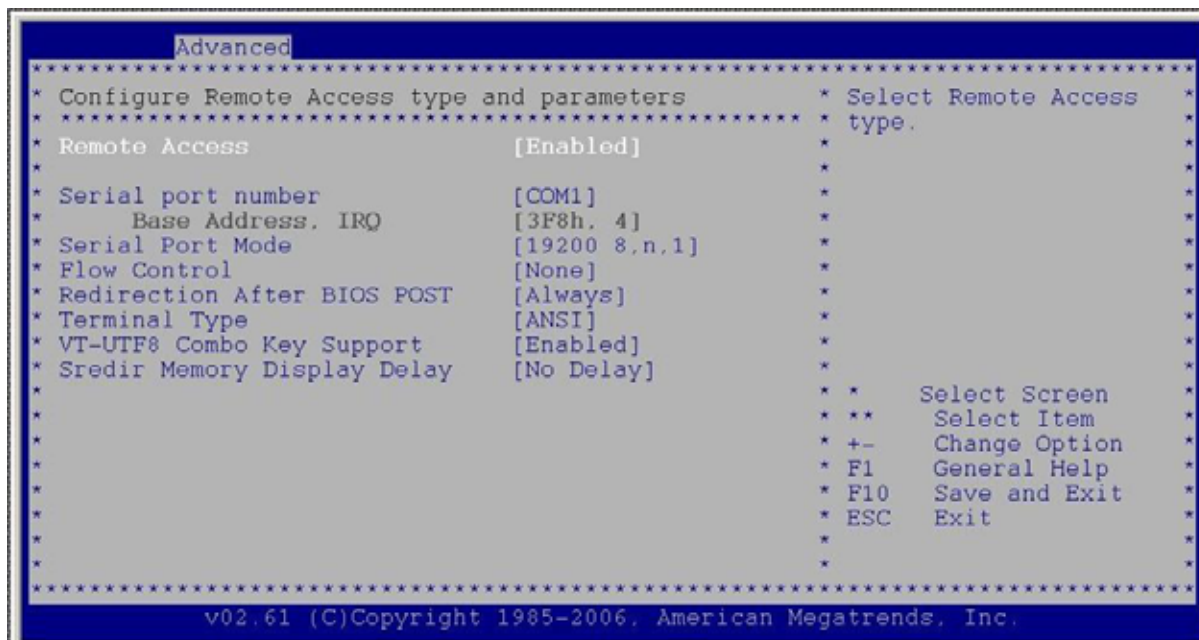
```
                                    Boot
*****************************************************************
* Boot Settings Configuration          * Allows BIOS to skip   *
* ************************************* * certain tests while   *
* Quick Boot              [Enabled]    * booting. This will    *
* Quiet Boot              [Disabled]   * decrease the time     *
* AddOn ROM Display Mode  [Force BIOS] * needed to boot the    *
* Bootup Num-Lock         [On]         * system.               *
* PS/2 Mouse Support      [Auto]       *                       *
* Wait For 'F1' If Error  [Enabled]    *                       *
* Hit 'DEL' Message Display [Enabled]  *                       *
* Interrupt 19 Capture    [Disabled]   *                       *
*                                      *                       *
*                                      *                       *
*                                      * *      Select Screen  *
*                                      * **     Select Item    *
*                                      * +-     Change Option  *
*                                      * F1     General Help   *
*                                      * F10    Save and Exit  *
*                                      * ESC    Exit           *
*                                      *                       *
*****************************************************************
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```
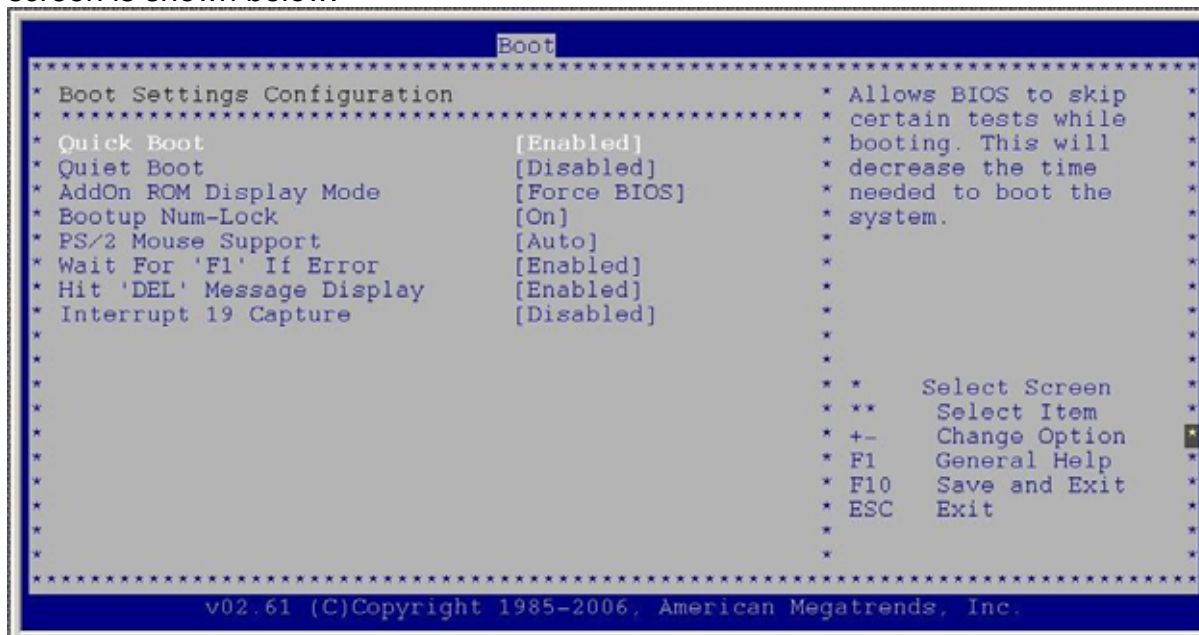
Quick Boot
The Optimal and Fail-Safe default setting is *Disabled*.

Quiet Boot
Set this value to allow the boot up screen options to be modified between POST messages or OEM logo. The Optimal and Fail-Safe default setting is *Enabled*.

Add-On ROM Display Mode
Set this option to display add-on ROM (read-only memory) messages. The Optimal and Fail-Safe default setting is *Force BIOS*. An example of this is a SCSI BIOS or VGA BIOS.

Boot up Num-Lock
Set this value to allow the Number Lock setting to be modified during boot up. The Optimal and Fail-Safe default setting is *On.*

PS/2 Mouse Support
Set this value to allow the PS/2 mouse support to be adjusted. The Optimal and Fail-Safe default setting is *Enabled*

Interrupt 19 Capture
Set this value to allow option ROMs such as network controllers to trap BIOS interrupt 19.

➢ BOOT DEVICE PRIORITY
Boot Device Priority

Use this screen to specify the order in which the system checks for the device to boot from. To access this screen, select Boot Device Priority on the Boot Setup screen and press <Enter>. The following screen displays:

```
                              Boot
****************************************************************
* Boot Device Priority                     * Specifies the boot  *
* ***************************************** * sequence from the   *
* 1st Boot Device      [SATA:4M-ST380817AS] * available devices.  *
* 2nd Boot Device      [Network:IBA GE Slo] *                     *
*                                           * A device enclosed in *
*                                           * parenthesis has been *
*                                           * disabled in the     *
*                                           * corresponding type  *
*                                           * menu.               *
*                                           *                     *
*                                           *                     *
*                                           *                     *
*                                           * *    Select Screen  *
*                                           * **   Select Item    *
*                                           * +-   Change Option  *
*                                           * F1   General Help   *
*                                           * F10  Save and Exit  *
*                                           * ESC  Exit           *
*                                           *                     *
*                                           *                     *
****************************************************************
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```

➢ Exit Menu

Select the *Exit* tab from the setup screen to enter the Exit BIOS Setup screen. You can display an Exit BIOS Setup option by highlighting it using the <Arrow> keys. All Exit BIOS Setup options are described in this section. The Exit BIOS Setup screen is shown below.

```
  Main    Advanced   PCIPnP    Boot    Security   Chipset   Exit
****************************************************************
* Exit Options                             * Exit system setup  *
* ***************************************** * after saving the   *
* Save Changes and Exit                    * changes.           *
* Discard Changes and Exit                 *                    *
* Discard Changes                          * F10 key can be used *
*                                          * for this operation. *
* Load Optimal Defaults                    *                    *
* Load Failsafe Defaults                   *                    *
*                                          *                    *
*                                          *                    *
*                                          *                    *
*                                          *                    *
*                                          * *    Select Screen  *
*                                          * **   Select Item    *
*                                          * Enter Go to Sub Screen *
*                                          * F1    General Help  *
*                                          * F10   Save and Exit *
*                                          * ESC   Exit          *
*                                          *                    *
****************************************************************
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```

Saving Changes and Exit
When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Exit Saving Changes from the Exit menu and press <Enter>.

Discarding Changes and Exit
Select this option to quit Setup without making any permanent changes to the system configuration. Select Exit Discarding Changes from the Exit menu and press <Enter>.

Discard Changes
Select Discard Changes from the Exit menu and press <Enter>.

Load Optimal Defaults
Automatically sets all Setup options to a complete set of default settings when you select this option. Select Load Optimal Defaults from the Exit menu and press <Enter>.

Load Fail-Safe Defaults
Automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.
Select Load Fail-Safe Defaults from the Exit menu and press <Enter>.